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Trends in childhood Immunization: An analysis of four states.

# **Trends in child immunization, from 1992 to 2015 in four states of India: coverage and major determinants.**

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**by**

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## **Trends in child immunization, from 1992 to 2015 in four states of India: coverage and major determinants.**

### **INTRODUCTION**

Immunization is the most cost effective method of child survival, recognized world over. All countries in the world have vaccination program, focusing on infants, children and pregnant women who form the high risk group. They are hence vaccinated against many preventable diseases. First vaccine was discovered against small pox in 1798 and turned out to be a great success.

WHO launched global immunization programme, known as Expanded Programme on immunization (EPI) to protect all children of the world against six vaccine preventable diseases, namely-diphtheria, whooping cough, tetanus, polio, tuberculosis and measles by the year 2000. Carrying the vision from WHO, the Expanded Program for Immunization (EPI) in India was launched in 1978. The National Health Policy of 1981, aimed at achieving universal immunization coverage of the eligible population by 1990. EPI program was further expanded by including measles vaccine and discontinuation of typhoid vaccine in the year 1985. It was then re-named as Universal Immunization Program (UIP). UIP aimed to cover all the districts in the country by 1990, in a phased manner and target all infants with the primary immunization and all the pregnant women with TT immunization. . In 2006, hepatitis B, second dose of measles and Japanese Encephalitis (JE) vaccine were included along with the other vaccines under EIP.

UIP in India targets 2.7 crore infants and 3.0 crore pregnant women every year and is one of the largest in the world [24,26].

National Technical Advisory Group of Immunization (NTAGI) in August 2010 along with Ministry of Health and Family Welfare (MoHFW) identified Dr. N.K. Ganguly , Ex-DG, ICMR to draft National Vaccine Policy. National Vaccine Policy aims to strengthen the health system and vaccine enterprise to ensure long-term supply of affordable vaccines in the country.

## Background

The health indicators for the country were very poor after independence. The crude death rate was 22.4 per 1000, the infant mortality rate of 162 per 1000 live births and life expectancy at birth was 26 years [1]. The scenario was grim to an extent that half of the total deaths happening were amongst children under 10 years. India was repository of smallpox and other endemic diseases. There was a significant gap in the need and the availability of preventive and curative services. Various committees were set up to chalk out the health services and other programs. These committees laid down the road map for the prioritizing the health needs. Child mortality and morbidity happened to top the list of burning health issues. So a need for preventive intervention was felt.

The National Health Policy (1981) developed as a result of Declaration of Health Issues at the International Conference on primary health, jointly sponsored by the World Health Organization and UNICEF at Alma Ata in 1978. Once India became signatory to the “Alma Ata Declaration”; the government started to develop the rural health infrastructure. The health of rural population had been neglected. The National Health Policy laid emphasis on availability of primary

healthcare for all by the year 2000. This policy identified several priority areas that needed special attention. These areas were:

1. Nutrition for all segments of population.
2. ***Immunization programme.***
3. Maternal and child health.
4. Prevention of food adulteration and maintenance of the quality of drugs.
5. Water supply and sanitation
6. Environmental protection
7. School health programme
8. Occupational health services
9. Prevention and control of locally endemic diseases.

The vaccination schedule that is being followed in the country is given in the following table:

| AGE   | VACCINE             | ROUTE OF ADMINISTRATION | DOSE    | DISEASE PROTECTED AGAINST |
|-------|---------------------|-------------------------|---------|---------------------------|
|       | BCG                 | Intradermal             | 0.1ml   | Tuberculosis              |
| Birth | OPV (dose at birth) | Oral                    | 2 drops | Poliomyelitis             |
|       | Hepatitis-B         | I/M                     | 0.5ml   | Hepatitis-B (Jaundice)    |

|              |                            |             |         |                                                       |
|--------------|----------------------------|-------------|---------|-------------------------------------------------------|
|              |                            |             |         |                                                       |
| 6 weeks      | DPT                        | IM          | 0.5ml   | Diphtheria,<br>Tetanus, Pertussis<br>(Whooping Cough) |
|              | (1 <sup>st</sup> Dose)     |             |         |                                                       |
|              | OPV (1 <sup>st</sup> Dose) | Oral        | 2 drops | Poliomyelitis                                         |
|              | BCG (if not given earlier) | Intradermal | 0.1ml   | Tuberculosis                                          |
|              | Hepatitis-B                | I/M         | 0.5ml   | Hepatitis-B<br>(Jaundice)                             |
| 10 weeks     | DPT (2 <sup>nd</sup> Dose) | IM          | 0.5ml   | Diphtheria,<br>Tetanus, Pertussis                     |
|              | OPV (2 <sup>nd</sup> Dose) | Oral        | 2 drops | Poliomyelitis                                         |
|              | Hepatitis-B                | I/M         | 0.5ml   | Hepatitis-B<br>(Jaundice)                             |
| 14 weeks     | DPT (3 <sup>rd</sup> Dose) | IM          | 0.5ml   | Diphtheria,<br>Tetanus, Pertussis                     |
|              | OPV (3 <sup>rd</sup> Dose) | Oral        | 2 drops | Poliomyelitis                                         |
|              | Hepatitis-B                | I/M         | 0.5ml   | Hepatitis-B<br>(Jaundice)                             |
| 9 months     | Measles                    | SC          | 0.5ml   | Measles                                               |
| 16-24 months | DPT                        | IM          | 0.5ml   | Diphtheria,<br>Tetanus, Pertussis                     |
|              | OPV                        | Oral        | 2 drops | Poliomyelitis                                         |

Each vaccination is given as a single injection into the muscle of the anterolateral aspect of the thigh or upper arm. Two injections should never be mixed but can be given at two different sites at the same time at a minimum distance of one inch [1].

## Review of literature

Immunization was started to prevent six Vaccine preventable diseases (namely tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis and measles), under one of the priority areas as defined in the National Health Policy, 1981. The Expanded Programme on Immunization (EPI) was started in 1978 with the objective of reducing morbidity, mortality and disabilities due to these six diseases. The vaccines were made available free of cost for the eligible children. Vaccine against Polio was added to the programme in 1979-80 and tetanus toxoid for school children was added in 1980-81. The latest addition to the programme is vaccination against measles in 1985-86.

Government launched Universal Immunization Programme (UIP) in 1985-86, to enhance the implementation of immunization scheme. UIP was started with two main objectives:

1. To vaccinate at least 85 per cent of all infants by 1990 against six vaccine preventable diseases.
2. To achieve self-sufficiency in vaccine production and the manufacture of cold chain equipment.

The success of the immunization program is determined by the percentage of immunization coverage, and not by the decrease in the morbidity or mortality related to the vaccine preventable diseases. Immunization coverage in various states show glaring gap between the targets and the achievements till this day [2]. The contrasting figures have been attributed to the demographics

and the different socioeconomic strata's present in the country. The heterogeneity in the population and the cultures is well reflected in the immunization coverage figures of different states [22]. Further studies have shown that lack of awareness about the benefits of immunization is another reason for the abysmal coverage. The people engaged in daily wages, find it unnecessary to leave their work and waste time for immunization, which earns them their bread and butter for the day. Although the immunization is provided free of cost, still people from the lowest economic strata do not avail this opportunity, due to the cost involved in travelling. Firstly, the loss of day's wage and secondly the cost involved in travelling to the health facility [24]. The fact that immunization coverage depends upon many socio-cultural and demographic factors has been reinforced by studies showing a co-relation with the level of mother's education and also the economic status of the family. It has been found out that children of the educated mothers are more likely to be immunized fully than the children born to the mothers who are illiterate. Also the households that fall in the lowest segment of wealth index, their children are less likely to be immunized. Whereas, the children who are born in the households which have better economic status are more likely to be immunized [16].

The studies have brought to light various factors that determine immunization coverage in the Indian scenario.

## **Problem Statement:**

Immunization coverage is far away from the goal of 85% in almost all the states, of the country. The BIMARU nomenclature has been changed to EAG states, which are the Empowered Action Group States. Both Bihar and Rajasthan are EAG states. And the other two states are the affluent states (Punjab and Haryana). Little is known about the social determinants of immunization coverage, despite the fact immunization coverage increasing gradually over the years in the affluent states.

With this study the social and economic factors that affect the immunization coverage in the four states of Rajasthan, Bihar, Haryana and Punjab would be dealt with. These states, have different demographics and cultures, this study would account for the dominant factors that have determined the immunization coverage in these states, over the last 30 years.

### **Justification for the study.**

There has been a lot of variation in terms of immunization coverage in various states of the country. Fully vaccinated children in different states range from 4% in Nagaland to and 75% in Goa. The data from year 1992-93 shows skewed immunization coverage. The states that showed abysmal coverage were Bihar (11%), Assam (19%), Uttar Pradesh (20%), and Rajasthan (21%) [1]. These states account for more than 40% of the population in the country and the low coverage in these states led to a low coverage rate for the nation as a whole. The northern, western and southern states show better coverage rates. So the first set of states for making a comparison are Bihar and Rajasthan, since both the states had very less coverage to begin with. Bihar and Rajasthan were earlier referred to as BIMARU states. The trend over the next decade would be analyzed to determine the recent scenario and determine the extent to which the immunization coverage has improved.

Punjab and Haryana are the next set of states to be compared. Both are affluent states and their geographical areas are similar. Punjab with an area of 50,362 sq km, and Haryana with an area of 44,212 sq km, can be compared with respect to immunization coverage.

### **Objectives**

#### Major objective

- To analyze the immunization coverage in four states, making comparisons between Rajasthan and Bihar; Punjab and Haryana.
- Identify the major social and economic determinants of immunization coverage.

#### Other/ Minor objectives

- To establish relationship between immunization coverage with household economic status and mother's literacy.
- Changes in immunization coverage over 20 years in the four states.

## Methodology

The study is based on the analysis of published reports. Analysis of population based studies that measured the coverage of immunization in different states of the country. These studies compiled data based on various independent variables that impact immunization coverage. The trends in the coverage for the four states have been picked up to do a comparative analysis.

Review of national and state reports would be done to compare the data that is available. The reports published by the ministry of Health and Family welfare, Government of India are the primary source for the data analysis. Reports from the ministry of Health and Family welfare would be the main source for the policy analysis.

A comparative analysis between the states of Rajasthan and Bihar and Punjab and Haryana would be done. This comparison would focus on the social determinants, which are the independent variables, on which the dependent variable that is, immunization coverage in the four states under review. This analysis would help interpret and explain the extent of co-relation between the immunization coverage and various social factors that come in to play.

## Analysis plan & expected outcome

There are two variables taken into consideration, the dependent variable and the independent variables. The dependent variable is the percentage immunization coverage in the four states. On the other hand, there are a number of independent variables that would be considered. These independent variables are, sex of the child, religious group to which the child belongs to, the setting to which the child belongs to may be rural or urban the level of the education of the mother, the economic status of the family.

The individual vaccine coverage for 12- 23 months of children in both the sexes in the year 1992, 2003-04, and 2006-07 would be compared. The comparison would be done between two backward states and two affluent states, based on these independent variables.

Out of these which independent variables, have led to a better coverage of immunization in one state over the other, would be determined. A set of recommendations for filling up the gaps realized in the immunization coverage and latest policy changes would be suggested.

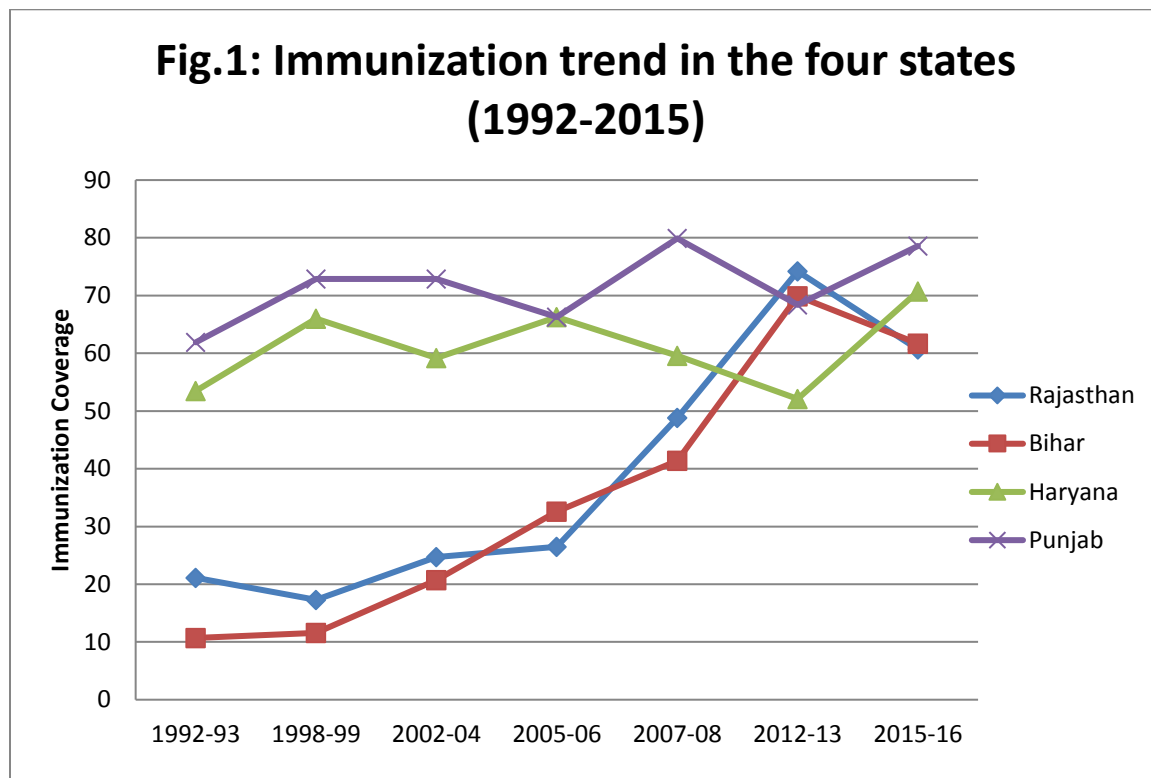
Further the objectives of the study to find if UIP has achieved the targets set and if not; what policy changes have been brought about to achieve success would be analyzed. Further the trend analysis over thirty years would confirm the validity of social and demographic factors playing a role in immunization coverage.

## **Discussion:**

There was abysmal coverage in the country, due to the most populous states (U.P., Bihar, Rajasthan, M.P.) having very low coverage. Although the affluent states had coverage more than 50%, but these states had less population in comparison to the ones having quiet low coverage[1]. Also these states had high under 5 mortality and morbidity since lack of immunization led to high incidence and prevalence of vaccine preventable diseases(VPD). There

were increased epidemics, leading to a large proportion of children getting affected. This added to the disease burden of the country.

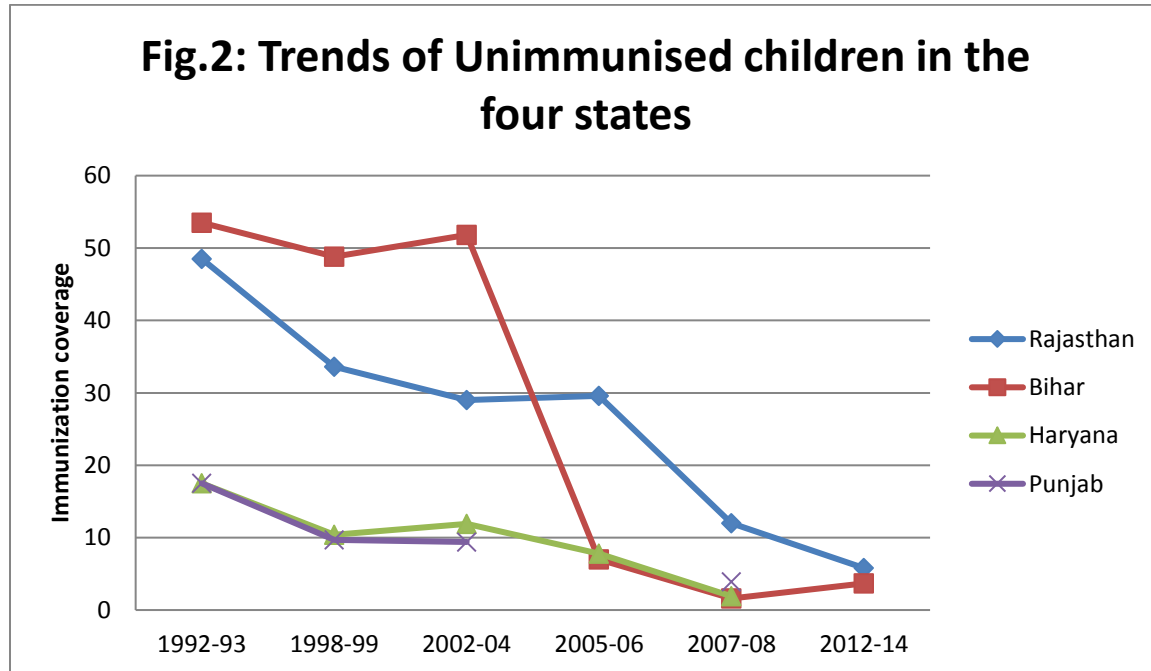
Despite several initiatives, a very large percentage of children remain without the essential immunization coverage. The urban-rural and gender differences pose great challenges to immunization coverage.



[2-11, 13, 17]

BCG, three doses of polio and DPT along with measles is considered as fully vaccinated. Taking fully vaccinated children in the states of Bihar, Rajasthan, Punjab and Haryana, a trend analysis is done. Bihar had the lowest percentage of fully immunized children between 12-23 months at

10.6%, in comparison to Rajasthan at 21.6%. But in the recent times, the coverage of both the states is around 61%. While the states of Haryana and Punjab began with a coverage of more than 50%. These states show increased coverage over the years but the increase in coverage seen in the backward states is much greater when compared with the affluent states.



[2-11, 13, 17]

The above line graph shows the percentage of children who did not receive any immunization. The trend shows a decline in the percentage of children who were not covered, beginning from 1992 till present. In case of Bihar and Rajasthan, there is a sharp decline seen

from the year 2002. For Bihar, the percentage of unimmunized children is as low as 1.6%, but in the year 2012 there is little increase to 3.6%. Comparing the decline with respect to Haryana and Punjab, it is seen to be very little decline since from the year 1992 only the percentage of children left unimmunized were only about 17.5%. This proves the success of the programme to a great extent, although this does not mention the drop out rates with respect to the individual vaccines.

### **Individual Vaccine coverage:**

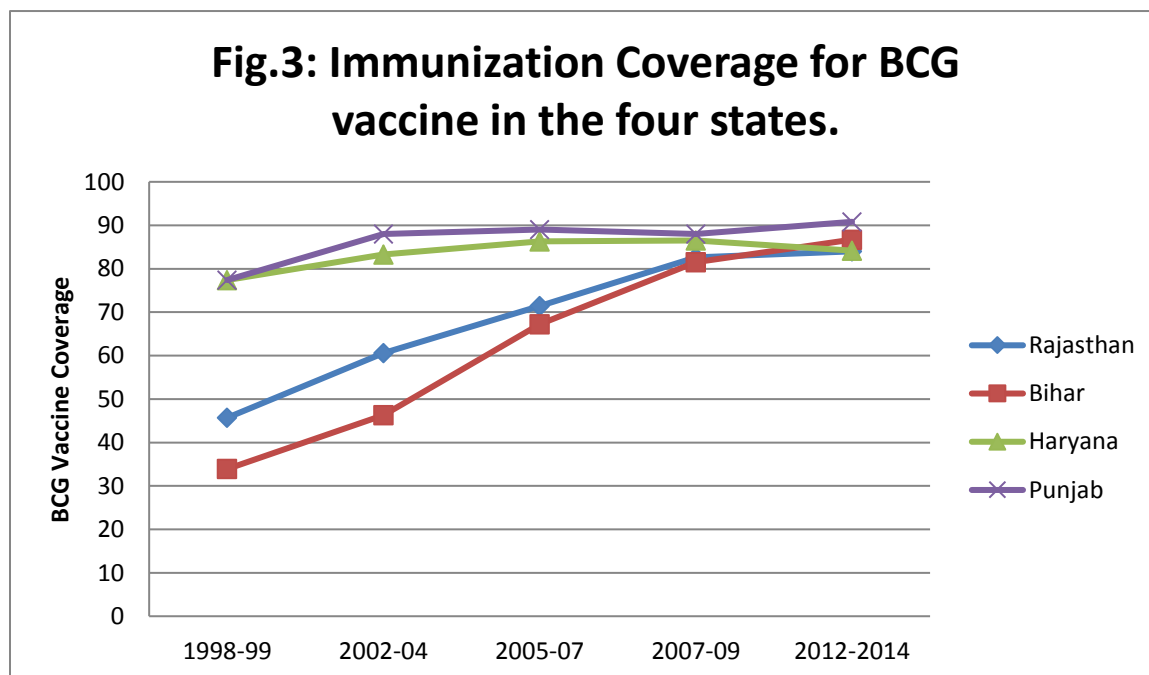
One of the important reasons for low overall immunization coverage is the dropout rate from the vaccination schedule. Some of the vaccines are given at the time of birth like BCG and Polio. In the recent past with the increase in the institutional deliveries, the coverage of these vaccines has increased to a great extent. To begin with, measles and DPT vaccines were included in the World Health Organization's Expanded Program on Immunization (1974), to reduce childhood morbidity and mortality. Other reason, for the sub-optimal coverage of these vaccines is the age-inappropriateness of the child when these vaccines are administered.

### **BCG Vaccine:**

It can be seen from the graph, the coverage for this vaccine has increased with the overall immunization coverage in the four states over the years. The states of Bihar and Rajasthan had very low coverage, below 50%. The total immunization coverage in Bihar for the year 1998-99 was 11.6% and for Rajasthan it was 17.3%, and out of that, around 50% of the children were vaccinated for BCG. This shows the high rate of coverage for BCG vaccine.

The coverage for BCG has improved consistently over the years for both Rajasthan and Bihar. In the year, 2012-14, the share of children immunized with BCG vaccine reached to 84% and 86.7% for Rajasthan and Bihar respectively.

On the other hand, the states of Haryana and Punjab had coverage of 77.4% for BCG vaccine in the year 1998-99 [ ]. Although the coverage has also improved in these states, but not to the extent seen in case of Rajasthan and Bihar. Over a span of sixteen years, the increase for the state of Punjab has been 13.4%. Whereas, for the state of Haryana the increase in BCG coverage has been mere 6.8% . These states had the coverage much beyond the other two states to begin with.



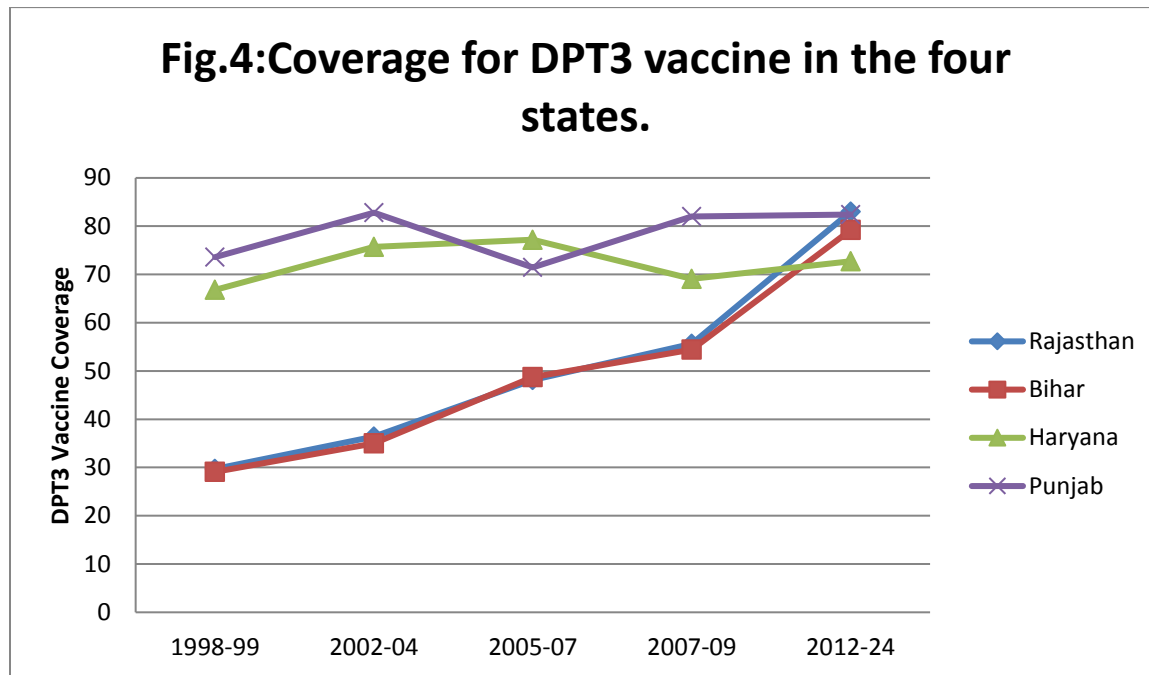
[2-11, 13, 17]

## **DPT3 Vaccine:**

Immunization coverage for DPT 1 was 47.8% and 42.8% for the state of Rajasthan and Bihar respectively in the year 1998-99. But the coverage for DPT3 was found to be 29.7% and 29.1% respectively. There is a dropout rate of 18.1% for Rajasthan and 13.7% for Bihar.

Similarly, for the state of Punjab and Haryana, the coverage for DPT1 was 81.9% and 80.5%, whereas for DPT3, it was 73.6% and 66.8%. So the dropout rates turn out to be 8.3% and 13.7%, which were quite high and the gaps needed to be addressed urgently. The high dropout rates happened to be the reason for overall low coverage rates.

The dropout rates have been brought down over the years for all the four states. This can be deciphered from the high coverage for DPT3 vaccine in the recent years. In the year 2012, Rajasthan has the highest coverage for DPT3 at 83%, while Haryana has lowest coverage amongst the four states that is 72.7%. While Bihar and Punjab have less coverage for this vaccine in comparison to Rajasthan at 79.2% and 82.4%. So in the year 2012, the coverage for Rajasthan has increased from 55.6% to 83%. Whereas for Bihar, the coverage increased from 54.4% to 79.2% in the year 2012. The rise in the individual vaccine coverage has led to increase in the overall immunization coverage for the state.

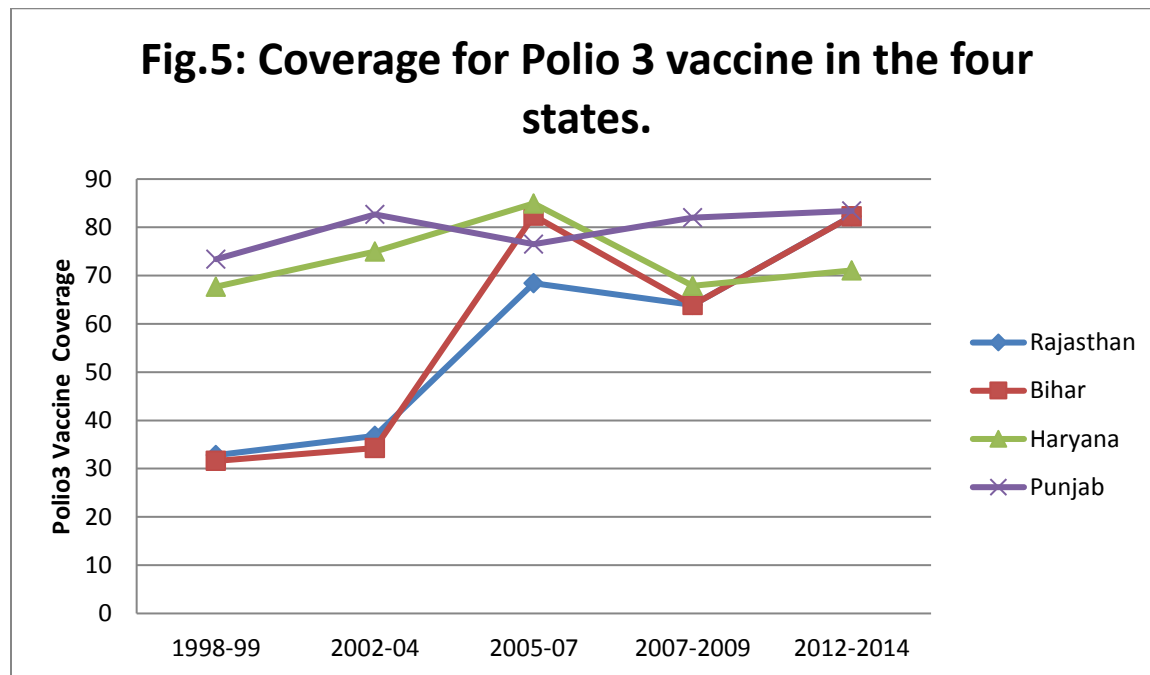


[2-11, 13, 17]

### Polio 3 Vaccine:

The coverage for polio vaccines has shown an upward trend due to the targeted program to eradicate polio in the nation. The Pulse Polio Program launched in the year 1995 has been a great success, with the WHO finally declaring India as polio-free in the year 2014.

The states of Rajasthan and Bihar had coverage at 32.8% and 31.6% in the year 1998-99. The coverage has shown a drastic upward trend in the year 2012 in comparison to the year 2009, reaching 82.3% from 63.9%, in case of Rajasthan and Bihar. The reason is the efforts to eradicate polio.

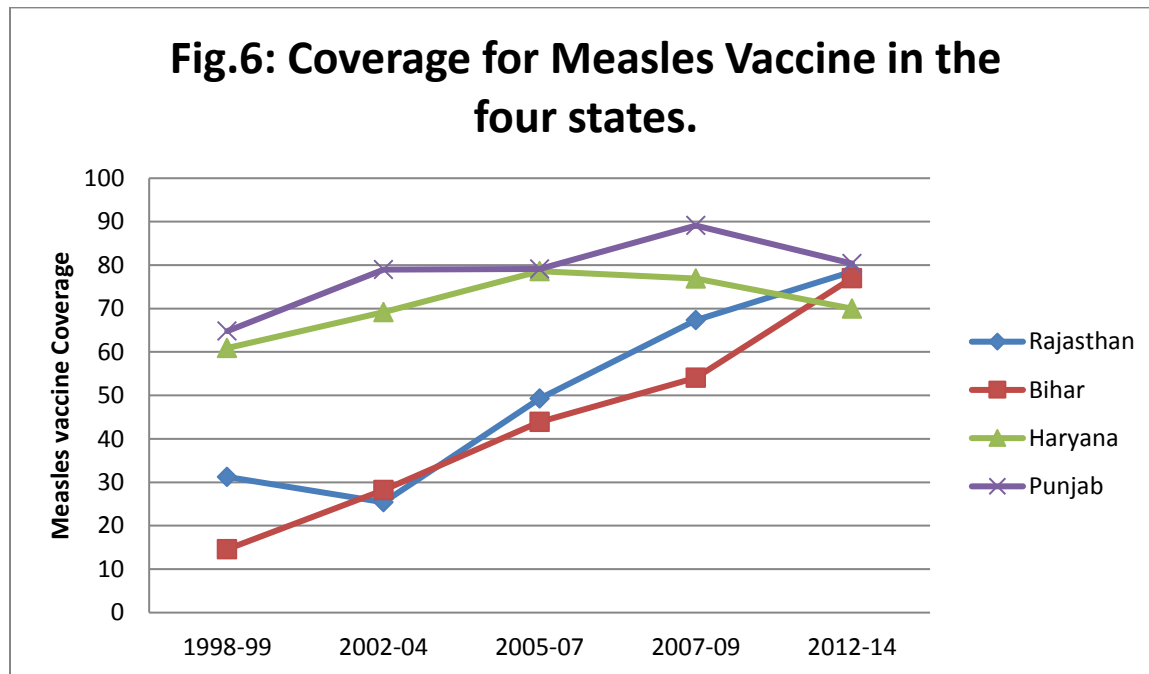


[2-11, 13, 17]

The state of Punjab and Haryana began with high coverage of 67.7% and 73.4%, in the year 1998-99, but in the year 2005 there has been a decline in the coverage for the state of Punjab and similarly in the year 2007 the state of Haryana also shows a downward trend with respect to the previous year. The latest figures available for the year 2015, show that Haryana shows a coverage of 75.3%, which is not very high in comparison to from where the coverage began. The state of Bihar, in the year 2015 shows a coverage of 72.9%.

## **Measles Vaccine:**

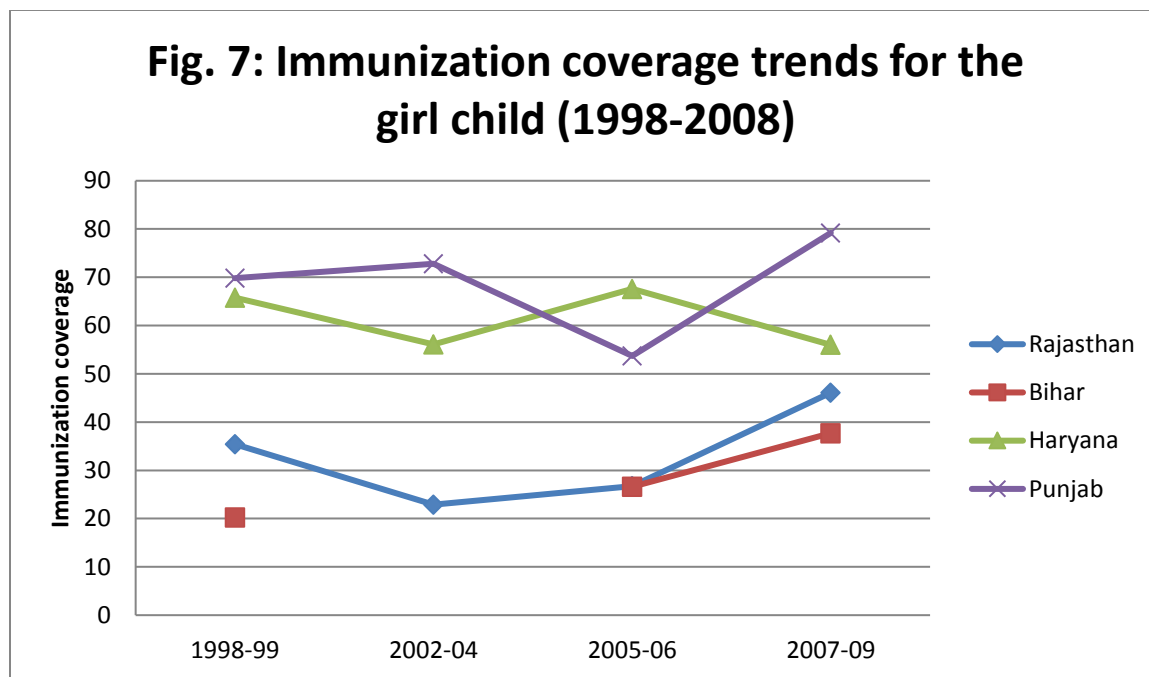
The coverage for measles vaccine was quiet low to begin with in all the four states being taken into consideration [20]. In the state of Bihar the coverage was minimal at 14.6% and in Rajasthan it was 31.2% in the year 1998-99. The coverage of measles vaccine depends upon the cultural reasons associate with this disease and for many ears people did not feel the need for getting their child vaccinated for measles. Whereas, some studies had found that more than 50% of measles related deaths in the world were found only in India [Simon and Morris]. The low coverage for measles vaccine was attributed for the overall low coverage in the states, especially in backward states.



[2-11, 13, 17]

The states of Punjab and Haryana had high coverage for measles vaccine from the year 1998-99, at 64.8% and 60.9%. The reason cited for this was the high overall coverage of immunization in these states. The coverage increased gradually over the years with increase in the awareness and off course the increase in the overall coverage. In the year 2012, it reached to 70% in the state of Haryana and 80.4% in the state of Punjab. In the recent figures available of 2015, the coverage for the state of Bihar has reached 79.4% and for the state of Haryana it has increased to 79%.

### Sex of the child:

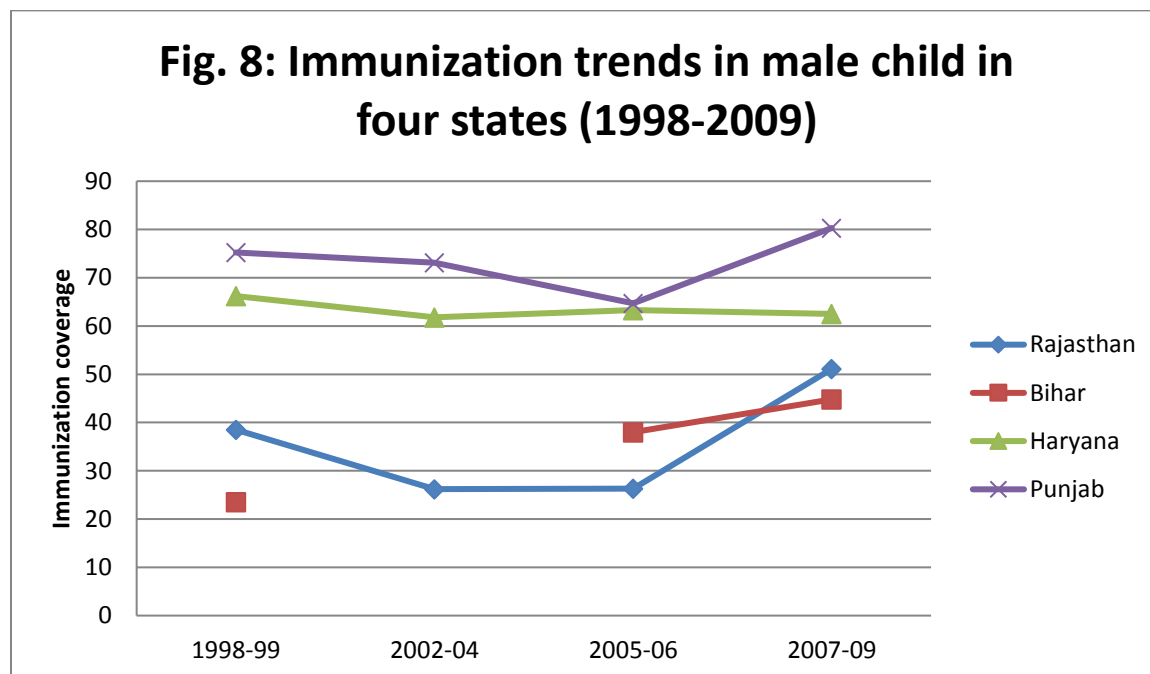


[2-11, 13, 17]

It is seen that there is higher immunization coverage for the male children in comparison to the female children, due to the prevalent norms in the society. Comparing the state of Bihar and Rajasthan, Bihar has a much lower immunization coverage of the girl child but the coverage

improved to 37.7% from 20%. The increase in coverage is not very significant. Same is the case in the state of Rajasthan, where the coverage improved from 35.4% to 46%. Both the states show the gender bias in the immunization coverage. These are the societies where health seeking behavior is seen with respect to the male child more in comparison to the female child.

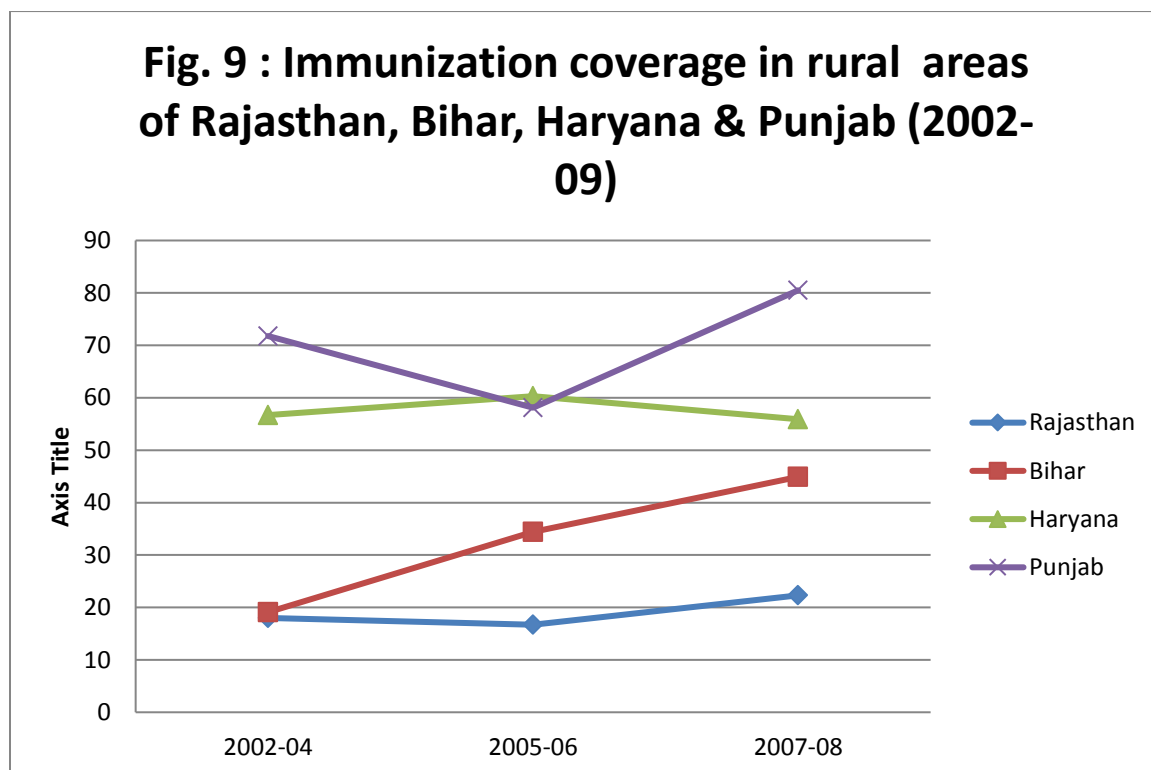
On the other hand, the states of Punjab and Haryana had more than 65% female children immunized in the year 1998-99, but the state of Haryana shows a downward trend then on 56% , then improving slightly and again decreases to 56% in the year 2007-09. In the state of Punjab the coverage reached 79% in 2007-09, which is due to the higher overall coverage for the state. The state of Haryana shows a higher coverage for the female child in comparison to the male child in the year 2007-09. This shows the success of various schemes and programmes targeting the gender bias and advocating support for the girl child.



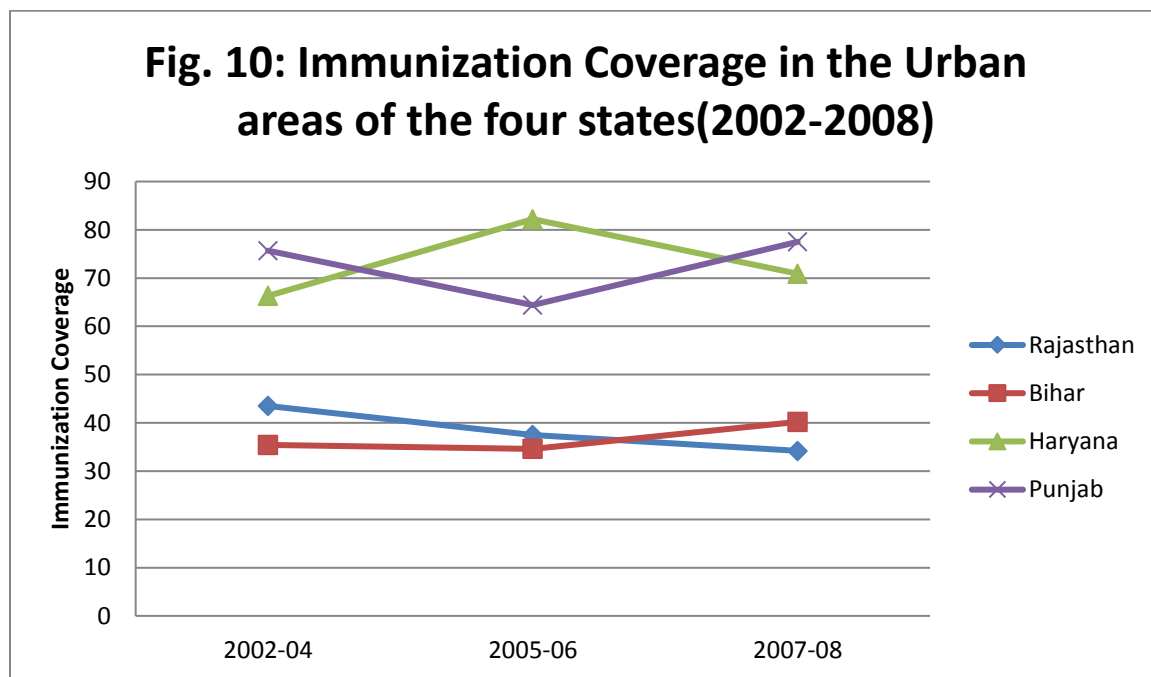
[3-5,8-11]

In Bihar out of total vaccination coverage of 32.8%, there is higher proportion of male child getting immunized in comparison to the girl child. On the contrary in the state of Rajasthan, there is very minor difference of 1.9% in the immunization coverage between the male and the girl child. In the year 2007-09 also the data for the two states show gender bias. This shows son preference and hence better health indicators for the male child.

### Rural- Urban:



[3-5,8-11]



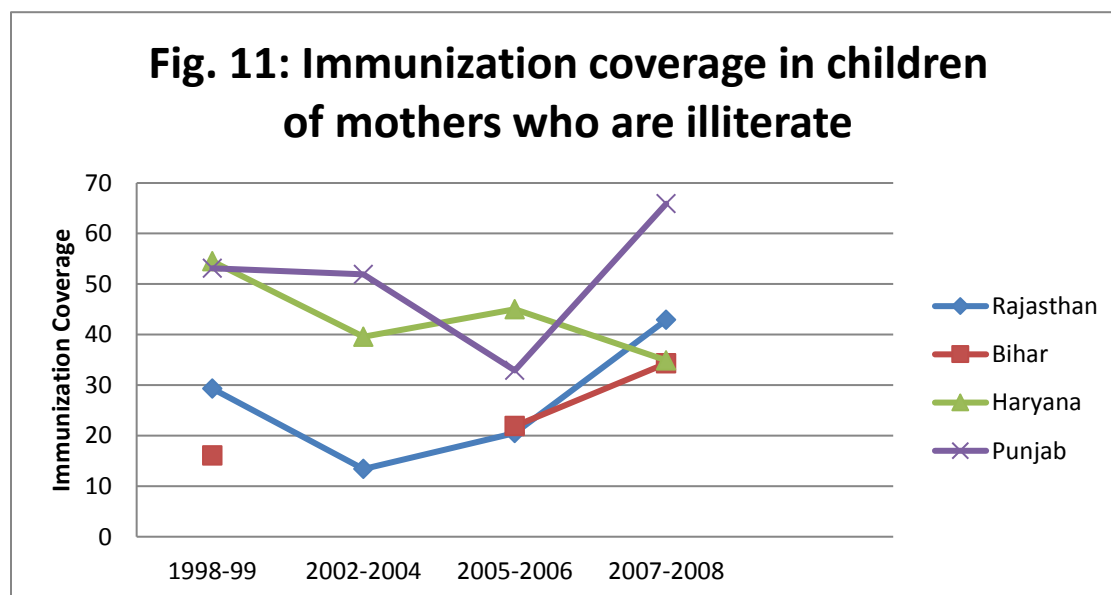
[3-5,8-11]

The above figure shows more coverage of each type of vaccine is more in urban areas than in the rural areas. Immunization coverage with respect to rural and urban settings shows a striking difference in

the state of Rajasthan. Whereas, in the state of Bihar difference between the rural and urban coverage is not very significant.

Out of the total fully vaccinated children (24.7%) in the state of Rajasthan, 43% of the children were in urban areas and only 18% of the children in the rural areas received the recommended vaccinations in the state of Rajasthan for the year 2002-04. The coverage decreased to 37.4% in the year 2005-06. On the contrary, in the state of Bihar, the immunization coverage for the rural areas is only 19.1%, whereas in the urban areas it is 35%, out of the total immunization coverage for the year 2002-04 at 20.7%. This coverage dips to 34.6 in the year 2005-06, but further increases to about 40% in the year 2007-09. The trends show a higher immunization coverage in the urban areas in comparison to the rural area. Looking at the percentage of children who received no vaccination at all is quite high in the state of Bihar at 51.8%, whereas in the state of Rajasthan, it is only 29% of the eligible children.

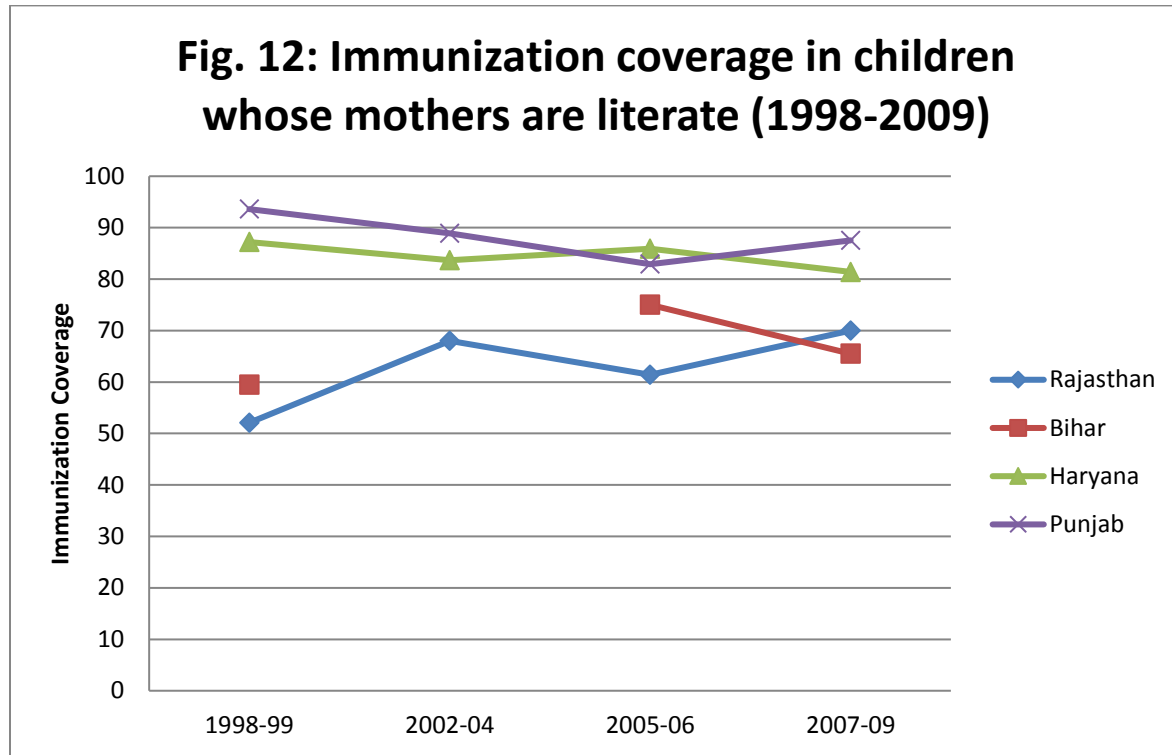
### Mother's Education status:



[2-11, 13, 17]

The trends show that there is an increase in the immunization coverage in the recent past, which is due to the increase in the overall coverage for the states. Although, the immunization coverage is low amongst children whose mothers are uneducated. So there is a very strong positive correlation with the education status of the mother and immunization coverage. But the reason for increase in immunization coverage over the years is seen due to increase in the overall immunization coverage in the respective states.

The figure below shows a strong positive correlation between the level of education of the mother and immunization coverage. It can be seen clearly from the diagram that there is a gradual increase in the immunization coverage with the increase in the level of education of the mother. There is very significant difference in the level of immunization coverage in the children whose mothers are literate and the ones whose mothers are illiterate. However, the role of other factors cannot be overlooked here. These may be the level of education of the family members, the level of awareness of the family members and the mother about the benefits of immunization.

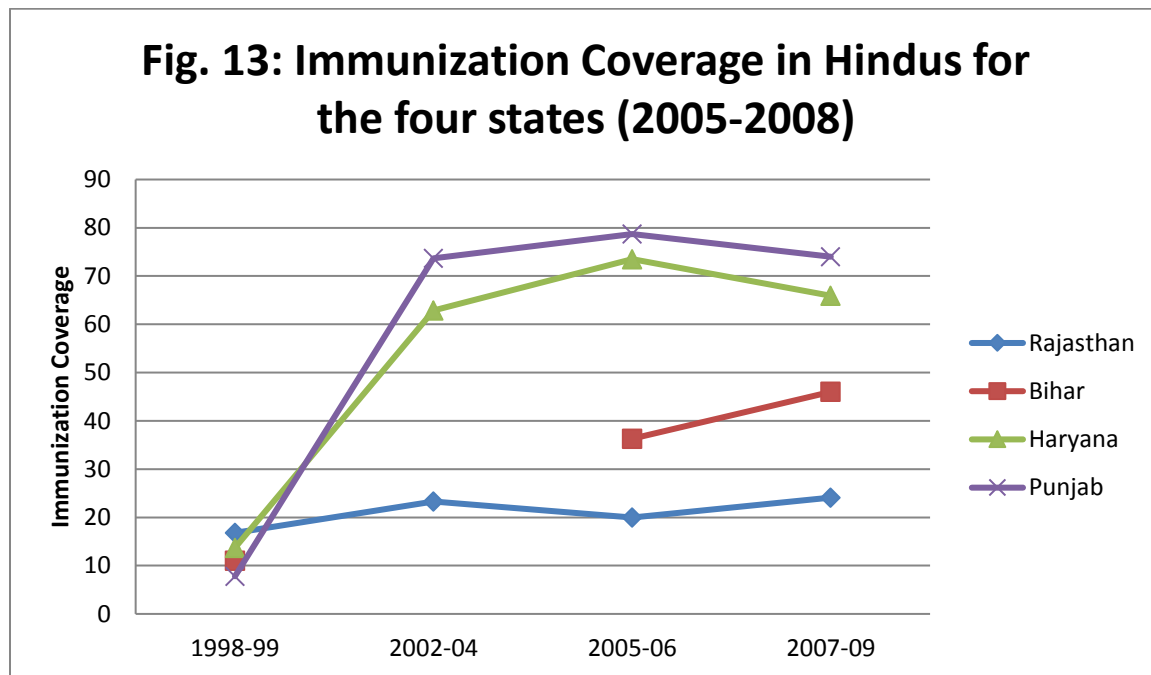


[2-11, 13, 17]

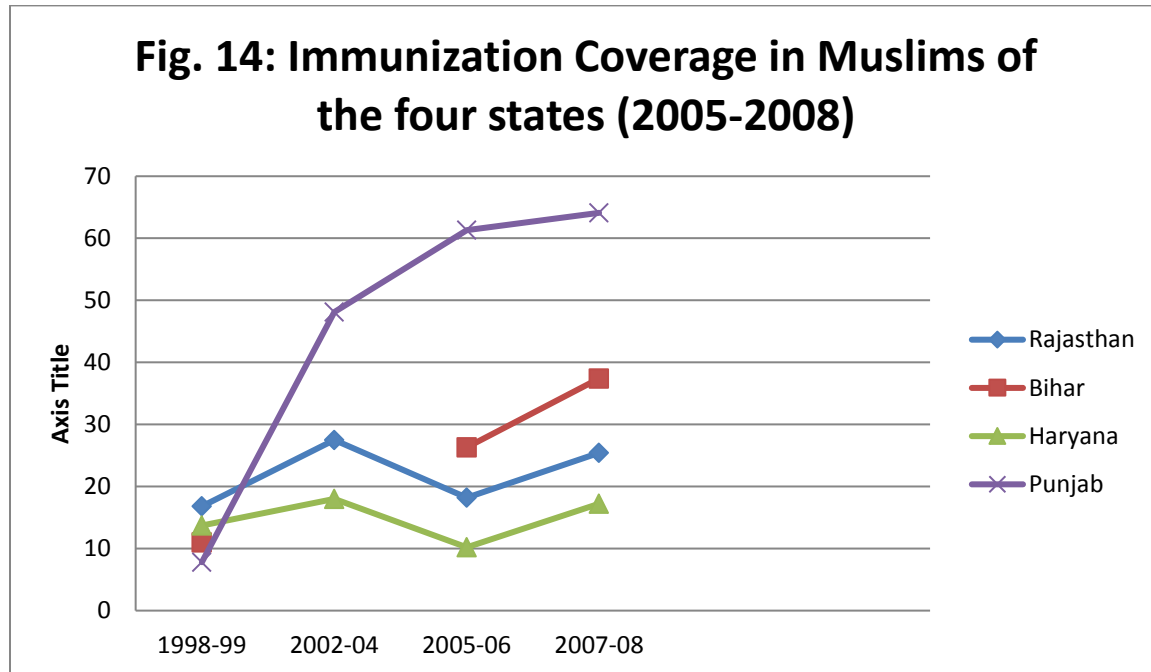
## Religion:

The figure below shows the variation in the immunization coverage with respect to the Hindus. There is a rise in the immunization coverage in the children born in Hindu families, in Bihar but in case of Rajasthan the rise is not very significant over the years. This can be seen from the line graph for the state of Rajasthan, which is almost a straight line. On the other hand, Bihar shows higher coverage in Hindus, but still the immunization coverage remains at 46% only.

On the contrary, the states of Punjab and Haryana had abysmal coverage in the Hindus to begin with at 7.8% and 13.6% respectively, but over the years the rise has been very significant. It reached to 65.9% for Haryana and 74% for Punjab.

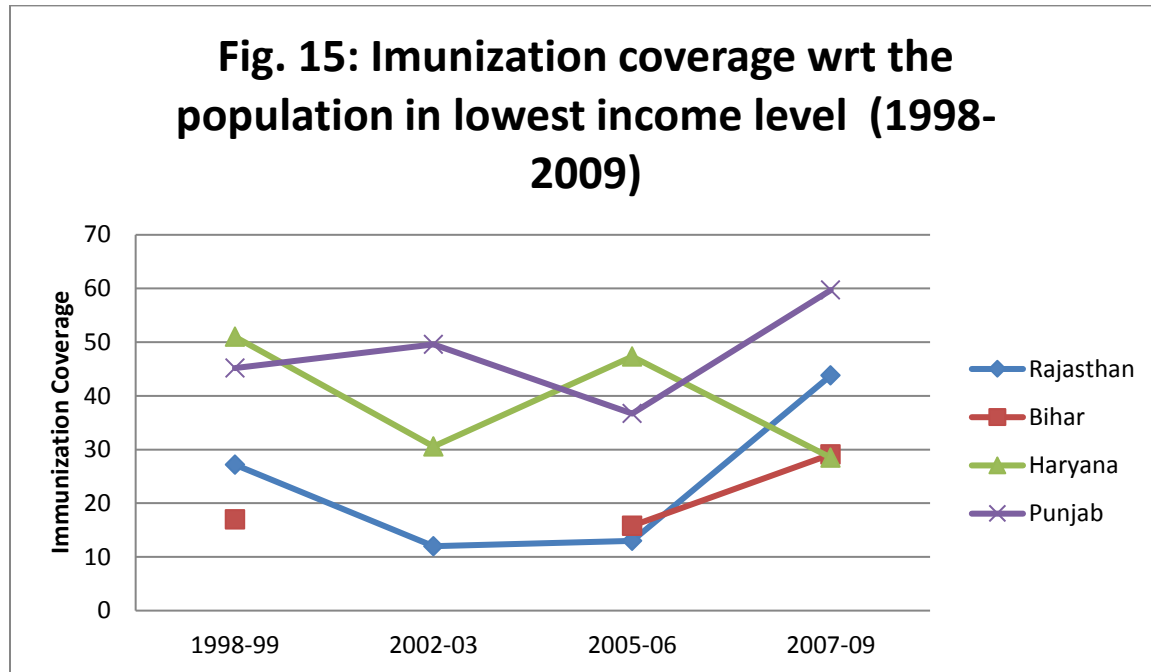


[2-11, 13, 17]



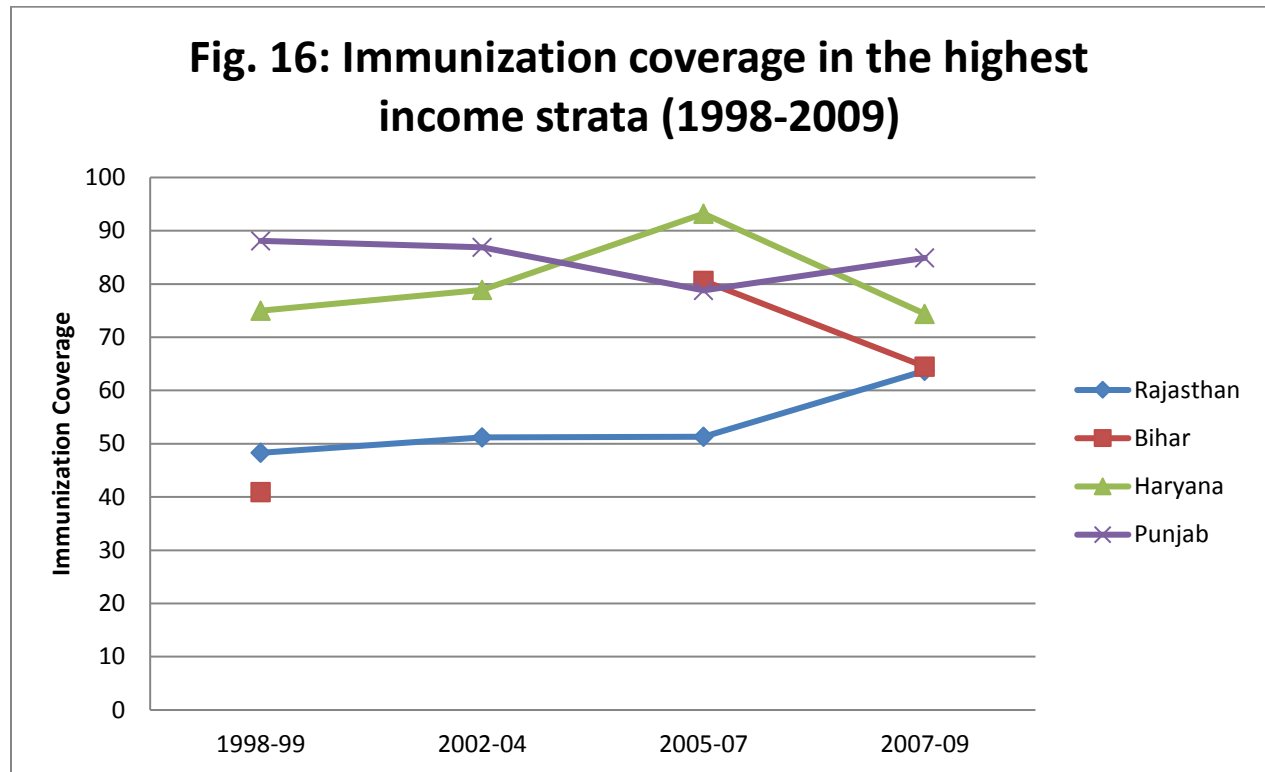
[2-11, 13, 17]

### Economic Status of the family:



[2-11, 13, 17]

The household income forms an important determining factor for immunization coverage. There is increase in the immunization coverage from the lowest income group to the highest in the state of Bihar. On the contrary, in the state of Rajasthan this is not so. This suggests that income level is not the sole variable on which the dependent variable (immunization coverage) depends. There must be other variables playing a role, confirming higher degree of correlation in comparison to the income level in the state of Rajasthan.



[2-11, 13, 17]

The line diagram shows almost straight line for the immunization coverage in the state of Rajasthan, meaning thereby that immunization coverage has not changed over the years for the high income group but the efforts to reach the low income group have been successful in increasing the immunization coverage. Although there is rise in immunization coverage from the year 2005 to the year 2007 in case of Rajasthan, which could be decrease in the dropout rates.

The states of Punjab and Haryana on the contrary show a very high coverage in the high income group, the reasons for the same could be better awareness about the benefits of immunization.

Also the dropout rates would be low and also the overall coverage of both the states is quiet high when compared to the other two states.

## **Conclusion:**

The discussion about the immunization coverage in the four states shows that despite the high importance given to childhood immunization in India's health policy initiatives, progress has been quiet slow. Also there are considerable inequalities that continue to exist in terms of regional disparities and socio-economic status. The regional disparities surface in terms of gender disparities, due to the cultural norms. The urban- rural divide continues to exist till date, although the gap has decreased over the years. Further, the economic condition happens to be a very important determinant in immunization coverage. It has been found that even in the most backward states, the immunization coverage is quiet high for the higher economic strata. Lastly the educational status of the mother qualifies to be the most important factor on which the immunization of the child depends. It was found that after the Janani Suraksha Yojana (JSY), the mothers are educated about the benefits of immunization for the child. Due to the same reason, even the dropout rates have fallen and there has been increase in the immunization coverage. A lot has been achieved, but the efforts are ongoing to achieve 90% coverage with the launch of Mission Indradhanush in 2015 and sustain the same by 2020.

### **Shortcomings of the study:**

The analysis done is based on data taken from multiple sources and not a single source. The published data from different sources like National Family Health Survey, District Level Household Survey, and Annual Health Survey over the years has been used to do the trend analysis. Unavailability of some data is another shortcoming from the same source to do the analysis. Further, the analysis does not take into consideration all the ethnic and linguistic minorities into consideration as variables.

## References:

1. *National report*. (1991-92). Retrieved june, 23, 2016, from [http://rchiips.org/nfhs/pub\\_nfhs-1.shtml](http://rchiips.org/nfhs/pub_nfhs-1.shtml)
2. *Child health programme in india.*, 2016, from [mohfw.nic.in/WriteReadData/l892s/6342515027file14.pdf](http://mohfw.nic.in/WriteReadData/l892s/6342515027file14.pdf)
3. Kumar, D., Singh, J. P., & Ram, F. *DLHS-2, Punjab, 2002-04*. Mumbai: IIPS.
4. Kumar, S., Sharma, N. D., & Ram, F. (2005). *Reproductive and child health district level survey. Rajasthan, 2002-04*. Mumbai: IIPS.
5. *DLHS-4, Punjab, 2012-13*(2015). . Mumbai: IIPS.
6. *NFHS-4, Bihar fact sheet* (2016). . Mumbai: IIPS.
7. Paswan, B., Ram, F., Ladusingh, F., & et al. (2010). *District level household and facility survey, Bihar. 2005*. Mumbai, India: IIPS.
8. Paswan, B., Ram, F., Ladusing, L., & et al. (2010). *District level household and facility survey, Rajasthan, 2007-08*. Mumbai: IIPS.

9. Singh, S. K., Arnold, F., & Singh, L. (2008). *NFHS-3, Haryana, 20005-06*. Mumbai: IIPS.
10. Singh, S., Kishor, S., & Singh, L. (2008). *NFHS-Bihar* IIPS, Mumbai.
11. Unisa, S., & Ram, F. P.,B. (2010). *District level household and facility survey, Punjab, 2007-08*. Mumbai: IIPS.
12. *Global vaccine plan* (2013). . USA: WHO.
13. Gupta, K., Arnold, F., & Vaidehi, V. (2008). *NFHS-3, Rajasthan, 2005-06*. Mumbai: IIPS.
14. *Mission Indradhanush operational guidelines* (2015). . New Delhi: Ministry of Health and Family welfare, India.
15. National institute of population studies. (2016). *National family health survey*. Retrieved june, 2016, from <http://rchiips.org/nfhs/>
16. Patra, N. (2006). Universal immunization programme in India: The determinants of childhood coverage. *Social Science Research Network*, (881224)
17. Ram, F., Singh, J. P., & Kumar, D. (2005). *DLHS-2, Haryana, 2002-03*. Mumbai: IIPS.
18. *Annual health survey 2012-13 fact sheet Rajasthan*.(2014). (Population. New Delhi- 110011: Registrar General & Census Commissioner, India, Ministry of Home Affairs.
19. Gupta, R., Makhija, S., & Sood, S. (2015). Discrimination in seeking medical care for female child from birth to adolescence- A retrospective study. *Indian Journal of Pediatrics*, 83(5), 410-413.
20. Hurt, A. (2015). Measles in india: Challenges & recent developments. *The One Health Journal*, 5
21. Johri, M., Subramanian V.S., & Sylvestre, M. P. (2015). Association between maternal health literacy and child vaccination in india: A cross- sectional study. *Journal of Epidemiology Community Health*, 69, 846-857.

22. Lahariya, C. (2014). A brief history of vaccines & vaccination in india. *Indian Journal of Medical Research*, 139, 491-511.
23. Rammohan, A., & Awofeso, N. (2015). District-level variations in childhood immunizations in india: The role of socio-economic factors and health infrastructure. *Social Science & Medicine*, 145, 163-172.
24. Sharma, B., Mahajan, H., & Velhal, G. D. (2013). Immunization coverage : Role of sociodemographic variables. *Advances in Preventive Medicine*,
25. Singh, K. P. (2013). Trends in child immunization across geographical regions in india : Focus on rural- urban and gender. *Plos One*, (9)
26. Taneja, G., Sagar K.S., & Mishra, S. (2013). Routine immunization in india: A perspective. *Indian Journal of Community Health*, Vol. 25(2)